

DISCUSSION OF THE AMENDMENT

The specification has been amended by inserting --in terms of phosphorus content-- with respect to the degree of phosphorylation, as supported by the certified English translation of corresponding international application PCT/JP2004/015501 **submitted herewith**.

While the inserted term did not appear in this US national stage application as filed, Applicants entering the national stage in the United States are required to file, according to 35 U.S.C. 371(c) and 37 C.F.R. 1.495(c), an English translation of the international application if the international application was filed in another application and was not published under PCT Article 21(2) in English. Thus, the present national stage application is such an application. See also M.P.E.P. 1893.01(d). As confirmed therein, the translation **must** be a translation of the international application as filed or with any changes which have been properly accepted under PCT Rule 26 or any rectifications which have been properly accepted under PCT Rule 91 (emphasis added). Thus, the specification herein is required to have the inserted term.

The claims have been amended by inserting --in terms of phosphorus content--, where applicable.

In addition, Claims 1, 22 and 26 have been amended by adding a phosphorylation degree limitation, as supported in the specification at paragraph [0020]. Claims 9, 13, 15, 17, 24 and 27 have been amended by narrowing said phosphorylation degree limitation, as also supported in the specification at paragraph [0020].

No new matter is believed to have been added by the above amendment. Claims 1, 3-9, 13, 15, 17 and 19-30 remain pending in the application. Claims 1, 3-9, 13, 15, 17, 19-22 and 29 are active; Claims 23-28 and 30 stand withdrawn from consideration, but are subject to rejoinder.

REMARKS

The rejections under 35 U.S.C. § 103(a) of:

Claims 1, 3-5, 9, 13, 15, 19-22 and 29 as unpatentable over Padilha et al, Talanta 45 (1997) 317-323 (Padilha et al) in view of US 2,482,755 (Ford et al) and Zeronian et al, *Journal of Applied Polymer Science*, Vol. 25, 519-528 (1980) (Zeronian et al),

Claims 1, 3, 4, 6, 7, 9, 13, 15, 19-22 and 29 as unpatentable over US 4,851,120 (Reineke et al) in view of Zeronian et al,

Claims 1, 2, 4, 8, 9, 13, 15, 17, 19-22 and 29 as unpatentable over US 3,691,154 (Bernadin) in view of Zeronian et al,

are respectfully traversed.

As recited in above-amended Claim 1, an embodiment of the present invention is a carbamidated cellulose II phosphate, wherein said cellulose II phosphate has a degree of phosphorylation of from 3 to 20 wt% in terms of phosphorus content.

Zeronian et al discloses treatment of cellulose I with sodium hydroxide solution (mercerization), thereby forming a cellulose II. Further, Zeronian et al discloses that after mercerization, in the presence of pyridine, the phosphorylation was performed by reacting a phosphorus oxychloride for 6 to 24 hours at 25 to 60°C (Table 1). Zeronian et al additionally discloses that mercerization prior to phosphorylation makes cellulose more receptive to phosphorylating agents, i.e., phosphorus oxychloride, resulting in a more uniform phosphorylation product, but it occurs when using a never-dried mercerized cellulose (cellulose II) (paragraph bridging pages 521- 522). Since the dried mercerized cellulose is disclosed as causing nonuniform distribution of phosphorus, it is not preferable to use the dried mercerized cellulose (sentence bridging pages 527-528). Fig. 1 of Zeronian et al shows that the phosphorus uptake for the never-dried mercerized cellulose was higher than that for cellulose I, but that the phosphorus uptake for the dried mercerized cellulose was lower than

that for cellulose I. Further, Fig. 1 shows that the phosphorus uptake for the dried mercerized cellulose was less than 4%. Thus, Zeronian et al teach away from the use of a dried mercerized cellulose.

The Examiner relies on Padilha et al for a disclosure of mercerized cellulose phosphate for removal of heavy metal ions, and the disclosure therein that their cellulose phosphate was prepared according to the method of “Ford and Hall,” which the Examiner finds is Ford et al. Ford et al discloses phosphorylation of cellulose I in the presence of urea and that their process may be applied to fibrous materials having previously been given other treatments such as “bleaching, mercerization, parchmentization, dyeing, printing and sizing,” provided the treatment does not interfere with flame resistance (column 9, lines 46-51).

Clearly, if one of ordinary skill in the art used a mercerized cellulose in Padilha et al, who does not disclose or suggest cellulose II phosphate, in view of Zeronian et al in order to increase the receptivity of cellulose to a phosphorylating agent and to obtain a phosphate having uniform distribution of phosphorus, one would have used the never-dried mercerized cellulose of Zeronian et al. While one might have used the process of Ford et al to make the cellulose phosphate of Padilha et al using urea, the combination of Padilha et al, Ford et al and Zeronian et al could not have predicted that the phosphate of dried carbamidated mercerized cellulose would have a significant metal-adsorbing capacity compared, for example, to a corresponding non-dried mercerized cellulose or to a corresponding carbamidated cellulose I phosphate.

Note additionally that it has been known that urea is generally contained in such a reaction system as discussed above (i) in order to act as a solvent due to the high hydrophilicity of urea, (ii) in order to produce an alcohol to which the phosphoric acid is bound by breaking the hydrogen bond between celluloses to thereby promote the subsequent reaction, or (iii) in order to remove water produced through phosphorylation (i.e., dehydration

condensation) from the reaction system. Therefore, it would not necessarily be expected that Ford et al's product is carbamidated cellulose phosphate.

The claimed invention has been achieved by finding that the phosphate of carbamidated cellulose II prepared by using dried cellulose II has a much higher degree of phosphorylation than carbamidated cellulose I phosphate (cellulose II phosphate: P14.6% vs. cellulose I phosphate: P6.6%, as described in Example 1 of the specification herein) and has an excellent metal-adsorbing capacity. See also Examples 2 to 4 and Figs. 2 and 3, and water permeability, as shown in Example 6 and Fig. 4.

In addition, the newly-submitted Yabusaki Declaration further demonstrates the importance of the use of dried cellulose II when producing the claimed carbamidated cellulose II phosphate.

As clear from the Yabusaki Declaration, using a higher water content (relative value to the dried cellulose II of Example 1) of cellulose II as raw material resulted in lower absorbed amounts of zinc, and decrease in metal-adsorbing capacity. When using a never-dried cellulose II (a water content of 100%), high metal-adsorbing capacity could not be exhibited. Thus, it is clear that use of the dried cellulose II advantageously affects the metal-adsorbing capacity of the carbamidated cellulose II phosphate.

Reineke et al neither discloses nor suggests a cellulose II phosphate and thus, it is not relevant that Reineke et al may disclose phosphorylation of cellulose I in the presence of urea. As discussed above, the superior properties obtained by using cellulose II compared to cellulose I in the preparation of carbamidated cellulose phosphate could not have been predicted by the applied prior art.

Bernadin neither discloses nor suggests a cellulose II phosphate and thus, it is not relevant that Bernadin may disclose preparation of cellulose I phosphate using the "urea phosphate" method, followed by conversion to an alkali metal salt. As discussed above, the

superior properties obtained by using cellulose II compared to cellulose I in the preparation of carbamidated cellulose phosphate could not have been predicted by the applied prior art.

For all the above reasons, it is respectfully requested that this rejection be withdrawn.

The rejection of Claims 19-22 and 29 under 35 U.S.C. § 112, second paragraph, as indefinite, in the recital of the term “dried cellulose II,” is respectfully traversed. While a specific definition of “dried” does not appear in the specification, nevertheless, three different preparations of cellulose II, labeled as cellulose II material A, cellulose II material B and cellulose II material C, have been exemplified, as described in the specification at paragraph [0029]. For cellulose A, water was removed by filtration from a natural cellulose powder and the residue was dried at 70°C for six hours. Cellulose B was obtained after wringing a cotton fabric well to remove water and then dried at 70°C for six hours. Cellulose C was similarly wringed well to remove water and then dried. Clearly, given these examples, and the specification as a whole, one skilled in the art would understand the appropriate amount of drying necessary to realize the objectives of the presently-claimed invention as described in the specification. Accordingly, it is respectfully requested that the rejection be withdrawn.

The rejection of Claims 19-22 and 29 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, is respectfully traversed. Drying cellulose II and dried cellulose II is described in the specification at paragraphs [0019], [0029], [0030] and [0037]. Clearly, it cannot possibly be challenged that Applicants had possession of the **presently-claimed invention** as of the filing date. Accordingly, it is respectfully requested that the rejection be withdrawn.

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All of the presently-active claims in this application are now believed to be in immediate condition for allowance. The Examiner is respectfully requested to rejoin the non-elected claims of even scope and in the absence of further grounds of rejection, pass this application to issue with all pending claims.

Respectfully submitted,

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